

## **ABSTRACT OF THE DISCLOSURE**

The present invention is directed to optical structures and methods detecting the fluorescence of a molecule using metal-enhanced fluorescence. In particular, the invention describes the use of surface plasmon excitation for excitation of fluorophores near the metal 5 surface and the efficient collection of the emission by coupling into the plasmon resonance and directing towards the detector. More particularly, the present invention makes use of the unique directionality of the plasmon induced fluorescence signal. The present invention is directed to optical structures using metal enhanced fluorescence including: an optical fiber having a conductive external coating; a light emitting diode (LED) having a conical shaped 10 depression with curved sides on a front end surface, the curved sides having a conducting coating on the outer surface with respect to the LED.